REMARKS

I. General

Claims 1-31 were pending in the present application, and all of such claims are rejected in the current Final Office Action (mailed March 24, 2004). The outstanding issues raised in the Final Office Action are:

- Claims 1-10, 14, 17-20, 23, 25, and 27-31 are rejected under 35 U.S.C. § 102(a) as being anticipated by SIGGRAPH 2000 Conference Proceedings pg. 479-488 by Wei et al. (hereinafter "*Wei*");
- Claims 11-12 and 21-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei*;
- Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of U.S. Patent No. 6,232,981 to Gossett (hereinafter "*Gossett*"); and
- Claims 15, 16, 24, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of U.S. Patent No. 4,601,055 to Kent (hereinafter "*Kent*").

In response, Applicant respectfully traverses the outstanding claim rejections, and requests reconsideration and withdrawal thereof in light of the remarks presented herein.

II. Record of Examiner Interview

Applicant's attorney thanks the Examiner for his time and consideration in conducting the telephone interview of May 19, 2004. Applicant respectfully submits the following record of this telephone interview under M.P.E.P. § 713.04:

The following persons participated in the interview: Examiner Ryan Yang and Applicant's attorney, Jody Bishop. During the interview, claim 1 and the *Wei* reference were discussed. Applicant's attorney asserted that *Wei* fails to teach all elements of claim 1. Particularly, Applicant's attorney argued, as reasserted below, that *Wei* fails to teach a matrix comprising both random values and values that represent a desired structure, as recited by claim 1. No agreement was reached, but the Examiner requested Applicant to re-submit the arguments in this written response to allow the Examiner an opportunity to carefully review

PAGE 4/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

the *Wei* reference.

III. Rejections under 35 U.S.C. § 102(a) over *Wei*

Claims 1-10, 14, 17-20, 23, 25, and 27-31 are rejected under 35 U.S.C. § 102(a) as being anticipated by *Wei*. Applicant respectfully traverses this rejection as provided further below.

To anticipate a claim under 35 U.S.C. § 102, a single reference must teach every element of the claim, *see* M.P.E.P. § 2131. Applicant respectfully submits that *Wei* fails to teach each and every element of claims 1-10, 14, 17-20, 23, 25, and 27-31.

A. Independent Claims 1, 17, and 27

Wei fails to teach every element of independent claims 1, 17, and 27. For instance, independent claim 1 recites:

> generating a matrix of said desired size;
> providing values to said matrix, wherein said values comprise random values and wherein at least a portion of said values represents a desired structure according to which graphical features of a synthesized texture are to substantially conform; and
> executing a texture synthesis process that utilizes said matrix to generate a synthesized texture of said desired size having graphical features arranged therein substantially in conformance with said desired structure.
> (Emphasis added).

Independent claim 17, as amended herein, recites:

> a first data structure defining said sample texture of a first plurality of values;
> a second data structure defining a texture of a second plurality of values, wherein at least a portion of said values of said second data structure are random and wherein at least a portion of said values of said second data structure represent a desired structure according to which graphical features are to substantially conform; and
> a texture synthesis algorithm, said texture synthesis algorithm being operable to utilize at least said first data structure and said second data structure to generate a synthesized texture having graphical features arranged therein in substantial conformance to said desired structure. (Emphasis added).

PAGE 5/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

Independent claim 27, as amended herein, recites:

> code for generating a matrix of said desired size;
>
> code for initializing said matrix with a plurality of values, wherein at least a portion of said values are random and wherein at least a portion of said values represent a desired structure according to which graphical features are to be arranged; and
>
> code for generating a synthesized texture of said desired size having graphical features arranged therein according to said desired structure.
>
> (Emphasis added).

As noted in Applicant's previous response (mailed December 24, 2003) and discussed in the specification of the present application (*see e.g.*, paragraphs 0027-0033), Applicant respectfully submits that *Wei* does not teach at least the above-emphasized elements of independent claims 1, 17, and 27. For conciseness, Applicant addresses below the specific responses to Applicant's previous response that are provided in the current Final Office Action (in item 40 on pages 13-15 thereof).

As Applicant's attorney explained in the telephone interview of May 19, 2004, *Wei* fails to teach a matrix that is used in its texture synthesis process which includes both random values and values that represent a desired structure. As explained further below, *Wei* describes an initial matrix that is used in its synthesis process, which includes random white noise. However, this initial matrix does not include values that represent a desired structure. As also explained below, at a later stage in the operation of *Wei*'s texture synthesis process the matrix includes synthesized, low-resolution image values. At this stage, such matrix does not include random values, but instead include the synthesized low-resolution image values. Again, no matrix is provided in *Wei* that includes both random values and values that represent a desired structure.

With regard to independent claims 1, 17, and 27, the current Final Office Action asserts that the "examiner notes Gs is a Gaussian matrix, therefore the elements are random values (page 481 section 2), and since Gs is built from Is, it is substantially conformed to a desired structure (see 2.3)." Page 14 of Final Office Action. Thus, the Final Office Action appears to contend that *Gs* of *Wei* provides a matrix of a desired size, where such *Gs* contains random values. Further, the Final Office Action further contends that because *Gs* is built from *Is*, at least a portion of the values of *Gs* represent a desired structure according to which

PAGE 6/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

graphical features of a synthesized texture are to substantially conform. Applicant respectfully disagrees, as discussed below.

Wei is directed to a texture synthesis algorithm. Section 2 of *Wei* first describes how the texture synthesis algorithm works in a single resolution (section 2.1), and then describes how to extend this algorithm using a multiresolution pyramid to obtain improvements in computational efficiency (section 2.3). In section 2.1, *Wei* describes that the texture synthesis algorithm receives an input texture sample *Ia* and a white random noise *Is*. The texture synthesis algorithm forces the random noise *Is* to look like *Ia* by transforming *Is* pixel by pixel in a raster scan ordering. To determine a given pixel value *p* in *Is*, the given pixel's spatial neighborhood *N(p)* is compared against all possible neighborhoods *N(pi)* from *Ia*. The input pixel *pi* with the most similar *N(pi)* is assigned to *p*.

In this single-resolution instance, the white random noise matrix *Is* that is processed in the above manner to look like *Ia* does not include any values therein that represent a desired structure according to which graphical features of the synthesized texture are to substantially conform. Rather, *Is* of *Wei* merely contains random noise values, such as in the middle image of Figure 1 of *Wei*. Thus, the texture synthesis algorithm for the single resolution does not teach at least the above-emphasized elements of independent claims 1, 17, and 27.

In section 2.3, *Wei* proposes an extension to multiresolution synthesis. As *Wei* explains:

> The single resolution algorithm captures the texture structures by using adequately sized neighborhoods. However, for textures containing large scale structures we have to use large neighborhoods, and large neighborhoods demand more computation. This problem can be solved by using a multiresolution image pyramid [3]; computation is save because we can represent large scale structures more compactly by a few pixels in a certain lower resolution pyramid level.

Thus, *Wei* describes that a major advantage of multiresolution synthesis is that "moderately small neighborhoods can be used without sacrificing synthesis qualities." Section 2.3 of *Wei*. In describing the multiresolution synthesis technique, *Wei* provides:

> Two Gaussian pyramids, *Ga* and *Gs*, are first built from *Ia* and *Is*, respectively. The algorithm then transforms *Gs* from lower to higher

PAGE 7/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

> resolutions, such that each higher resolution level is constructed from the already synthesized lower resolution levels. This is similar to the sequence in which a picture is painted: long and thick strokes are placed first, and details are then added. Within each output pyramid level *Gs(L)*, the pixels are synthesized in a way similar to the single resolution case where the pixels are assigned in a raster scan ordering. The only modification is that for the multiresolution case, each neighborhood *N(p)* contains pixels in the current resolution as well as those in the lower resolutions. (Emphasis added).

Thus, the *Gs* pyramid is transformed from lower to higher resolutions, where each higher resolution level is constructed from the already synthesized lower resolution levels using the neighborhood processing technique for each pixel. The initial level (matrix) of the *Gs* pyramid does not include values therein that represent a desired structure according to which graphical features of the synthesized texture are to substantially conform. Rather, *Gs* is built from *Is*, which, as described above, is random white noise. *Ga* is built from *Ia*, which, as described above, is the input texture sample. Thus, initially *Gs* contains white random noise, just as *Is* initially includes white random noise in the above-described single resolution case. Accordingly, the first-level matrix of the *Gs* pyramid of *Wei* does not include any values therein that represent a desired structure according to which graphical features of the synthesized texture are to substantially conform.

During operation of the multiresolution synthesis algorithm, *Ga* and *Gs* are used in the synthesis algorithm in a manner similar to the use of *Ia* and *Is* in the above-described single resolution technique. Indeed, *Wei* states that the only modification to the single resolution algorithm for the multiresolution case is that each neighborhood *N(p)* contains pixels in the current resolution as well as those in the lower resolutions. *Wei* explains that these "lower resolution pixels constrain the synthesis process so that the added high frequency details will be consistent with the already synthesized low frequency structures." Section 2.3 of *Wei*. Again, the purpose of this multiresolution technique is to permit higher resolution textures to be synthesized with use of moderately small neighborhoods.

Accordingly, during operation of the multiresolution synthesis algorithm, a first level matrix of low resolution is generated in the *Gs* pyramid using the neighborhood approach. For example, a first level matrix of low resolution that may be generated in shown in Figure 7(a) of *Wei*. This first level (low resolution texture) is then used, rather than the white random noise matrix (initial level of the *Gs* pyramid), to generate a second level of higher

PAGE 8/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

resolution, such as the higher-resolution second level matrix of Figure 7(b) of *Wei*. In turn, this second level matrix may be used to generate an even higher-resolution third matrix, such as the third level matrix of Figure 7(c) of *Wei*.

Of course, the matrices used in the above-described stages of operation of the synthesis algorithm do not contain random values. Rather, such matrices (e.g., of Figures 7(a)-(c) of *Wei*) each includes a synthesized texture at progressively higher resolutions. For instance, the first level low-resolution matrix (e.g., matrix of Figure 7(a)) includes synthesized image values at low-resolution, and does not include any random values. As described above, such low-resolution first level is processed to generate a higher-resolution second level matrix of the *Gs* pyramid. This is what enables the pyramid approach of *Wei* to progressively improve resolution at each level of the pyramid.

In view of the above, the *Gs* pyramid initially (e.g., the initial "level" of the pyramid) provides a matrix that contains random white noise, and does not include any values that represent a desired structure. Each higher level of the *Gs* pyramid provides a matrix that contains synthesized texture image values at progressively higher resolution, and do not include any random values. Accordingly, at no level does the *Gs* pyramid include a matrix having both random values and values that represent a desired structure.

In view of the above, *Wei* fails to teach each and every element of independent claims 1, 17, and 27. As such, Applicant respectfully requests withdrawal of the rejections of claims 1, 17, and 27.

B. Dependent Claims 2-10, 14, 18-20, 23, 25, and 28-31

Dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 stand rejected under 35 U.S.C. § 102(a) as being anticipated by *Wei*. In view of the above, Applicant respectfully submits that independent claims 1, 17, and 27 are not anticipated by *Wei* because *Wei* fails to teach every element of those independent claims. Further, each of dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 depend either directly or indirectly from one of independent claims 1, 17, and 27, and thus inherit all limitations of the respective independent claim from which they depend. It is respectfully submitted that dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 are allowable not only because of their dependency from their respective independent claims

PAGE 9/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16

for the reasons discussed above, but also in view of their novel claim features (which both narrow the scope of the particular claims and compel a broader interpretation of the respective base claim from which they depend).

IV. Rejections Under 35 U.S.C. § 103(a)

Claims 11-12 and 21-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei*. Additionally, claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of *Gossett*. Further, claims 15, 16, 24, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of *Kent*.

Each of dependent claims 11-13, 15, 16, 21-22, 24, and 26 depends, either directly or indirectly, from one of independent claims 1 and 17 (and thus inherits all limitations of its respective independent claim). In view of the above, Applicant respectfully submits that independent claims 1 and 17 are of patentable merit. It is respectfully submitted that dependent claims 11-13, 15, 16, 21-22, 24, and 26 are allowable at least because of their dependency from their respective independent claims for the reasons discussed above.

V. Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge Deposit Account No. 08-2025, under Order No. 10015867-1 from which the undersigned is authorized to draw.

I hereby certify that this paper is being transmitted to the Patent and Trademark Office, facsimile number (703) 746-6009..
Date of Deposit: May 24, 2004

Typed Name: Carrie D. Wilson

Signature: ____

Respectfully submitted,

By: ____

Jody C. Bishop
Attorney/Agent for Applicant(s)
Reg. No. 44,034
Date: May 21, 2004
Telephone No. (214) 855-8007

PAGE 10/10 * RCVD AT 5/24/2004 6:42:42 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/2 * DNIS:7466009 * CSID: * DURATION (mm-ss):03-16